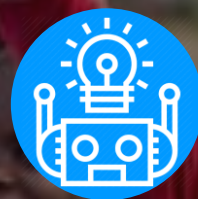


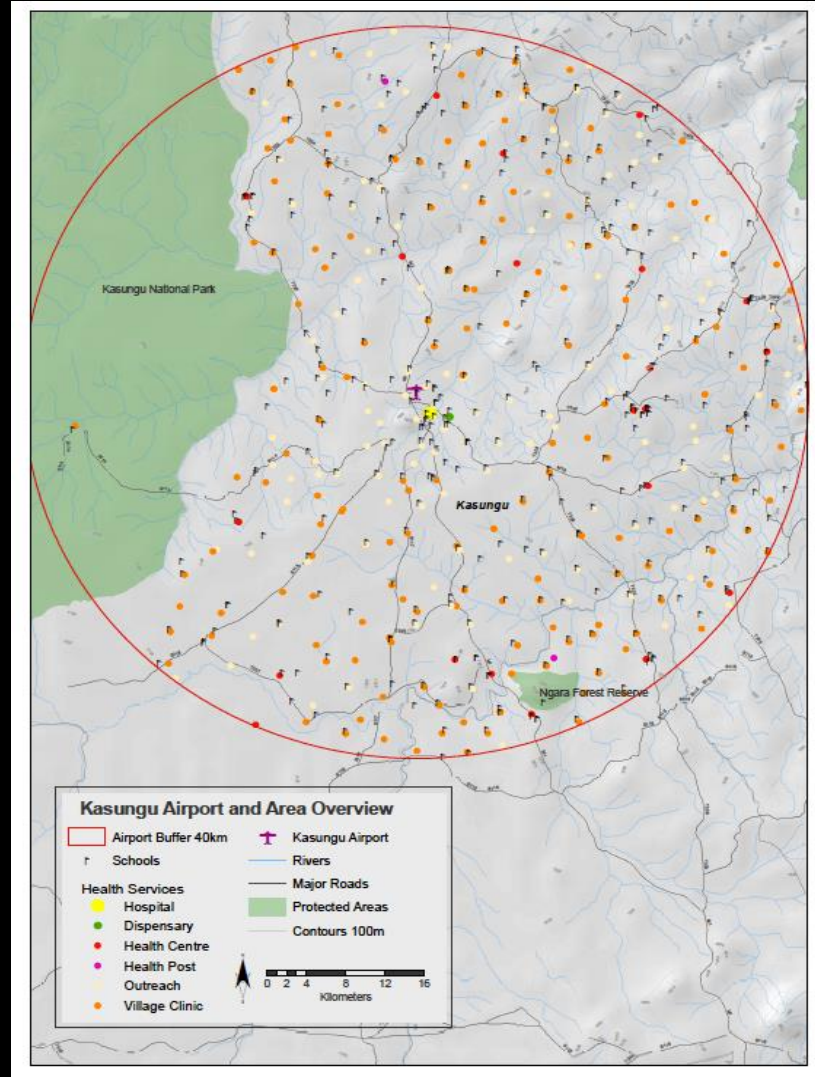
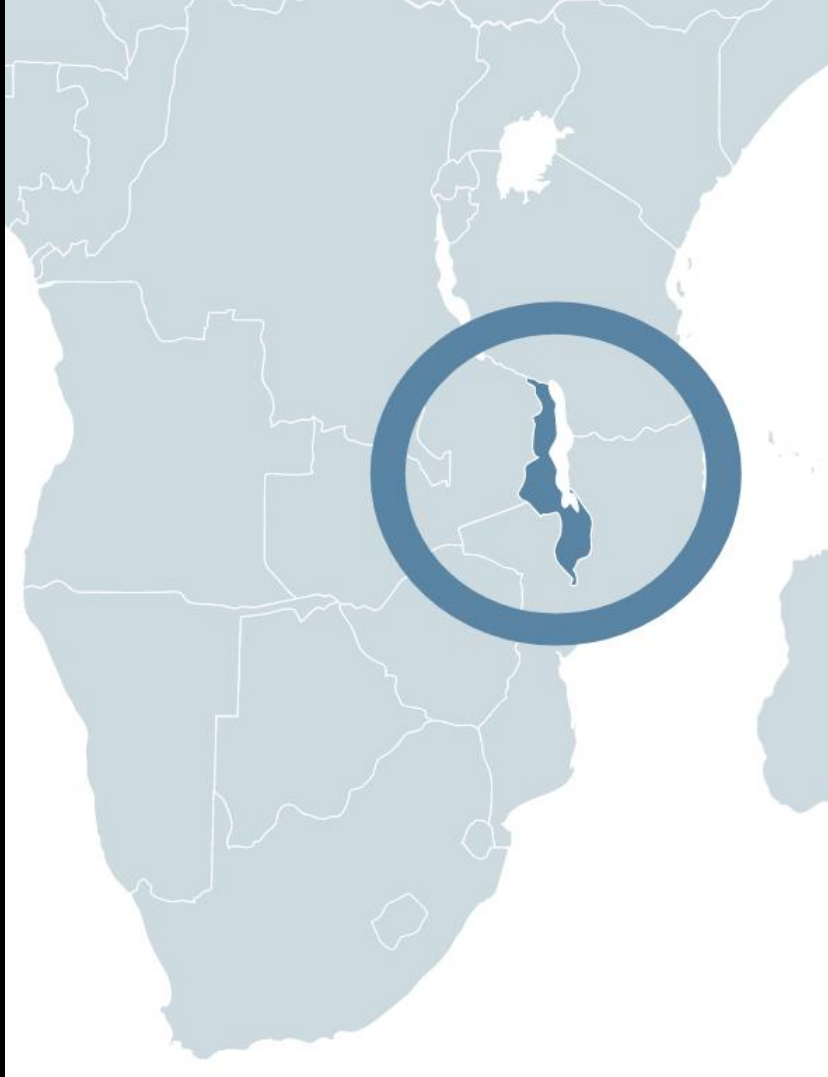
---

# DATA INNOVATIONS FOR CHILDREN IN MALAWI



**GEO-SPATIAL ANALYSIS, DRONES & MACHINE LEARNING**

AS TOOLS FOR DEVELOPMENT & HUMANITARIAN RESPONSE



# WHY INNOVATE IN MALAWI

## CHALLENGES AFFECTING CHILDREN & THEIR FAMILIES:

- One of the poorest countries in the world
- Over 80% of the population live in rural areas

### Health

- High maternal mortality rate
- Malnutrition, malaria, HIV/AIDS
- Cholera outbreak

### Emergency & Climate Change

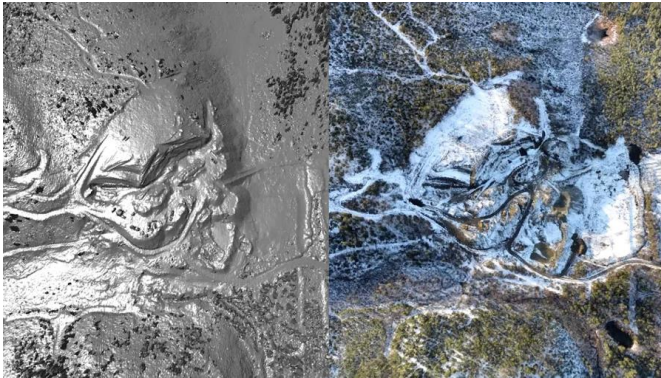
- Annual flood, annual famine
- Lack of access to water

Need to work beyond business as usual!



# The role of drones

## IMAGERY



Landslide risks  
Water resources  
Damage assessments  
Counting Displaced people

## CONNECTIVITY



Post-emergency cell/Wi-Fi  
Air Coordination UTM

## TRANSPORT



Supply Chain efficiency  
Rapid disease diagnosis

# TRANSPORT



*CONNECTIVITY*





# DRONES + MACHINE LEARNING

GLOBHE & IBM WATSON

- Tests in the Malawi drone testing corridor
- focuses on technology for imagery & mapping;
- Feeds drones captured images to *IBM Watson* to recognize different plants and seasonal changes through AI and image recognition



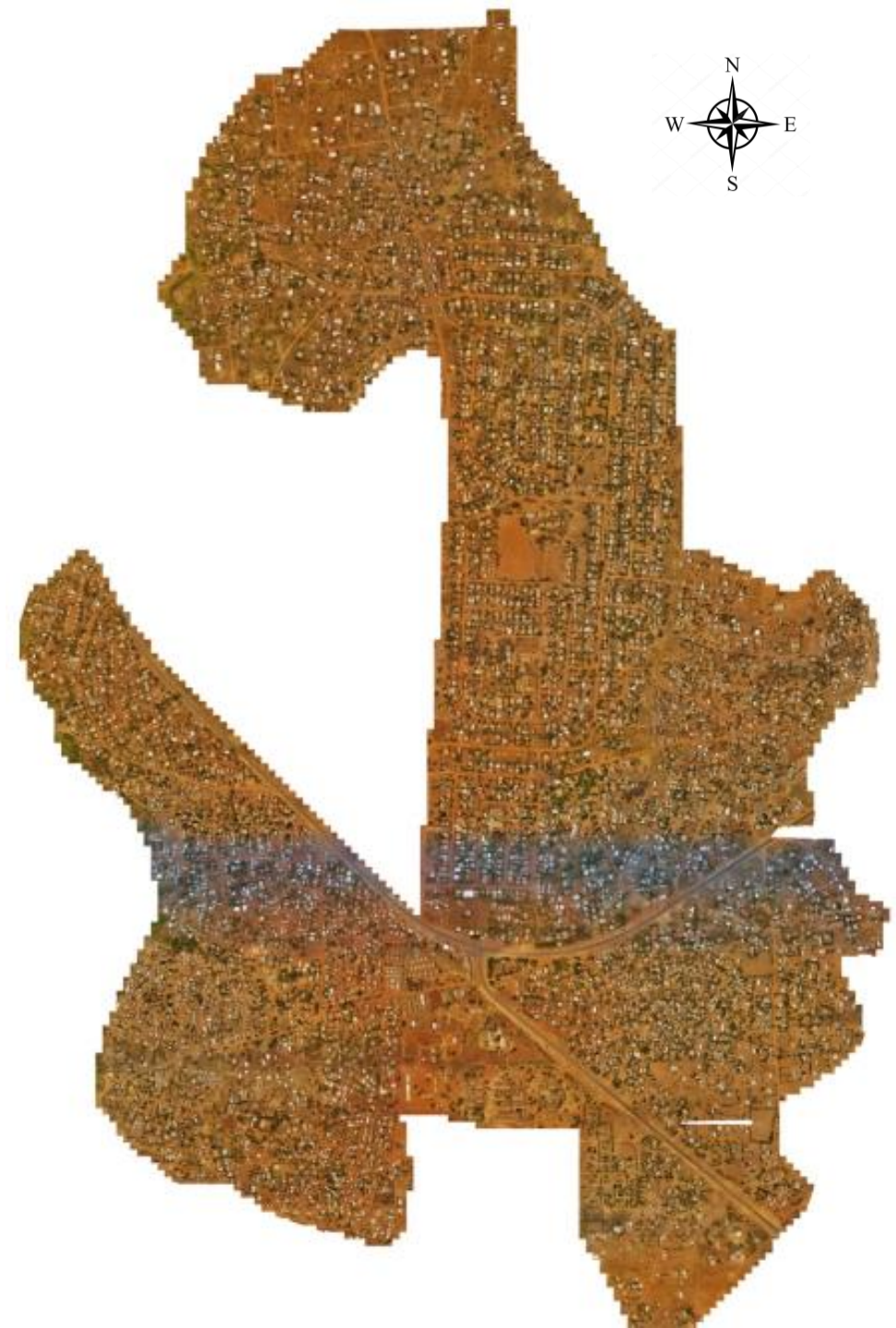


# ORTHOMOSAIC KASUNGU

The Kasungu site is a densely populated urban area, covering several neighborhoods, parts of major road network and infrastructure (e.g schools, health delivery points, house of worship).

Area: 7.15 km<sup>2</sup>  
Images: 6082  
Size of data: 5.3MB per image  
Number of flights: 27 in order to generate the desired  
2D and 3D maps

Processing time: The actual processing time has been between 5 - 10 min per image due to limited internet connectivity at that time which was heavily attributed by the power situation



# IMAGE ANALYSIS – How Does It Work?

Artificial Intelligence (aka algorithms) gets trained to recognize certain features in pictures through the use of “classifiers” and applies this logic to new pictures

Image	Classification	Score
Finished metal roof	roof_finished	0.60
Unfinished metal roof	roof_unfinished	0.55
Thatched roof	roof_thatched	0.90
Another thatched roof	roof_thatched	0.99

Other classifications shown in the interface:

- latrine: 0.09, 0.07, 0.07, 0.75, 0.48
- roof\_unfinished: 0.07, 0.05, 0.19, 0.04, 0.04

Legend:

- Tin Roofs
- Thatched Roofs
- Outdoor Sanitation
- School



# IMAGE ANALYSIS – Data Generation

This process helps to generate (statistical) data out of pictures and helps you to draw conclusions and make according recommendations

For example: **SDG Indicator 6.2.1** - Proportion of population using safely **managed sanitation services**, including a hand-washing facility with soap and water

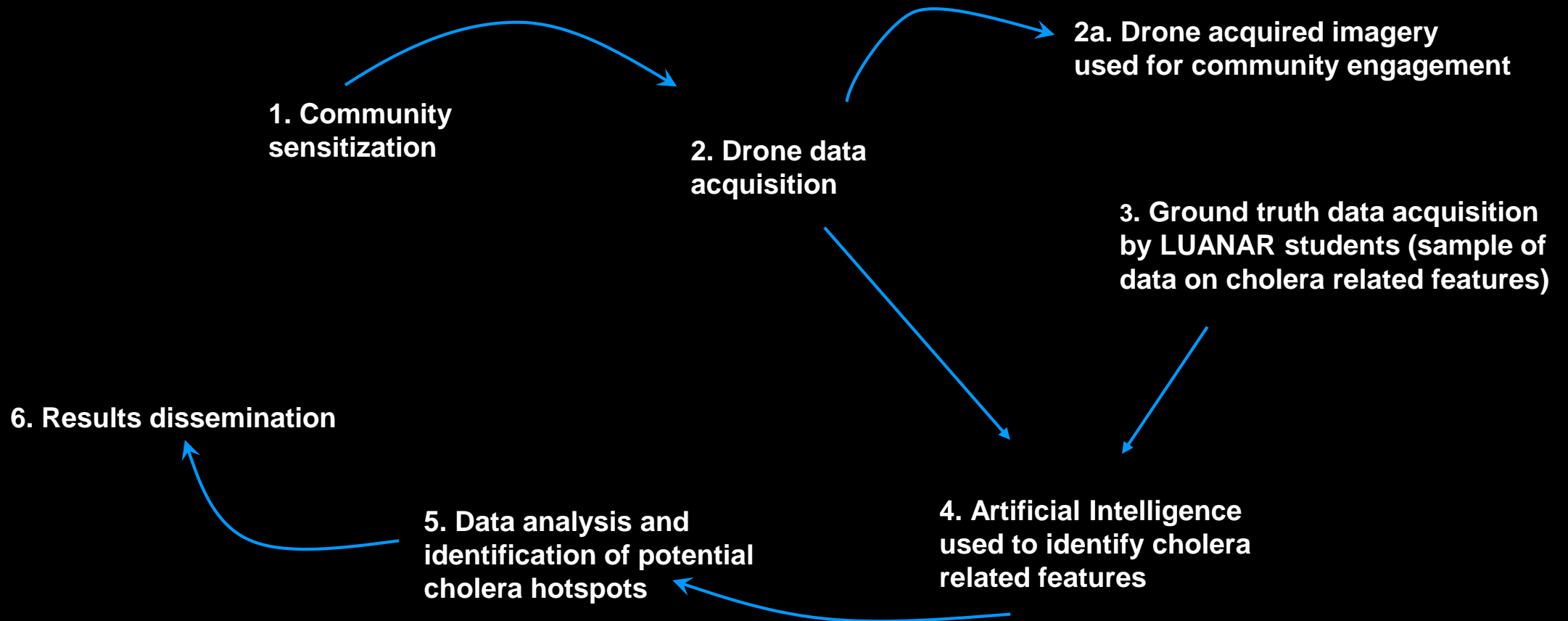
The map shows latrines with a 50m radius circle and provides an insight into the access to sanitation in this area.

At this test, the confidence level is at 70% as some detections might be missing (or falsely detected) - but with more training time the accuracy will improve.



# DATA FOR CHOLERA RESPONSE

GEO-SPATIAL + DRONES + MACHINE LEARNING APPLICATIONS





# Questions & Feedback

**Thank you from UNICEF Malawi**

Michael Scheibenreif | [mscheibenreif@unicef.org](mailto:mscheibenreif@unicef.org)